

## Mono-butyl phthalates

CAS No. 131-70-4

*Metabolites of dibutyl phthalates (CAS No. 84-74-2) and benzylbutyl phthalate (CAS No. 85-68-7)*

Dibutyl phthalates (di-n-butyl, di-iso-butyl) are industrial solvents or additives used in many consumer products such as nail polish, cosmetics, some printing inks, pharmaceutical coatings, and insecticides. People exposed to dibutyl phthalates will excrete mono-butyl phthalates (n-butyl, iso-butyl) in their urine. Exposure to benzylbutyl phthalate will also result in small amounts of mono-butyl phthalates appearing in the urine (Anderson et al. 2001). The amount of mono-butyl phthalates is an

indicator of how much contact with dibutyl phthalates has occurred.

Workplace air standards for external exposure to dibutyl phthalate have been established (NIOSH, ACGIH). Generally, dibutyl phthalates have low acute toxicity. Dibutyl phthalates have not been completely classified with respect to their carcinogenicity (U.S. EPA, IARC, NTP). Information about external exposure (environmental levels) and health effects is available from the EPA IRIS Web site at <http://www.epa.gov/iris> and from ATSDR at <http://www.atsdr.cdc.gov/toxprofiles>.

Concentrations reported here are similar to or slightly lower than those reported for a non-random subsample

**Table 64. Mono-butyl phthalates**

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999-2000.

|                               | Geometric mean<br>(95% conf. interval) | Selected percentiles<br>(95% confidence interval) |                     |                     |                     |                     |                   | Sample size |
|-------------------------------|--|---|---------------------|---------------------|---------------------|---------------------|-------------------|-------------|
|                               |  | 10th  | 25th                | 50th                | 75th                | 90th                | 95th              |             |
| <b>Total, age 6 and older</b> | 24.6<br>(22.7-26.6)                    | 5.70<br>(4.80-6.40)                               | 12.6<br>(11.0-14.3) | 26.0<br>(24.2-28.5) | 51.6<br>(46.9-56.1) | 98.6<br>(90.7-114)  | 149<br>(126-167)  | 2541        |
| <b>Age group</b>              |  |   |                     |                     |                     |                     |                   |             |
| 6-11 years                    | 41.4<br>(35.8-47.8)                    | 15.1<br>(11.0-16.9)                               | 23.0<br>(19.1-27.2) | 40.0<br>(33.7-50.3) | 75.5<br>(59.0-94.5) | 124<br>(92.8-166)   | 163<br>(114-306)  | 328         |
| 12-19 years                   | 36.0<br>(31.9-40.5)                    | 11.9<br>(8.10-14.8)                               | 20.0<br>(17.3-25.4) | 36.1<br>(31.7-42.3) | 67.7<br>(56.7-76.1) | 119<br>(94.3-146)   | 165<br>(133-209)  | 752         |
| 20 years and older            | 21.6<br>(19.7-23.6)                    | 4.70<br>(4.20-5.90)                               | 10.3<br>(9.40-11.6) | 23.0<br>(20.7-25.0) | 46.1<br>(39.7-51.3) | 95.0<br>(81.1-107)  | 142<br>(118-161)  | 1461        |
| <b>Gender</b>                 |  |   |                     |                     |                     |                     |                   |             |
| Males                         | 22.0<br>(20.2-24.0)                    | 5.70<br>(4.70-6.60)                               | 11.3<br>(9.90-13.0) | 23.1<br>(21.0-25.2) | 43.1<br>(36.9-49.3) | 83.9<br>(71.3-96.2) | 115<br>(96.2-142) | 1215        |
| Females                       | 27.3<br>(24.4-30.4)                    | 5.80<br>(4.10-7.60)                               | 13.8<br>(11.6-16.4) | 30.0<br>(26.1-33.1) | 59.5<br>(52.0-65.6) | 119<br>(100-143)    | 167<br>(145-218)  | 1326        |
| <b>Race/ethnicity</b>         |  |   |                     |                     |                     |                     |                   |             |
| Mexican Americans             | 23.4<br>(20.8-26.4)                    | 5.10<br>(4.40-6.10)                               | 11.8<br>(10.1-13.9) | 26.3<br>(23.6-29.2) | 48.1<br>(41.8-54.6) | 92.2<br>(71.9-107)  | 116<br>(101-136)  | 814         |
| Non-Hispanic blacks           | 37.0<br>(32.5-42.1)                    | 10.3<br>(8.00-14.4)                               | 22.2<br>(18.2-24.6) | 38.7<br>(34.5-42.6) | 78.2<br>(63.1-86.7) | 117<br>(104-149)    | 167<br>(143-192)  | 603         |
| Non-Hispanic whites           | 21.8<br>(19.8-24.0)                    | 5.00<br>(4.20-6.30)                               | 10.6<br>(9.60-12.5) | 23.1<br>(20.4-26.1) | 45.9<br>(39.1-51.6) | 90.2<br>(75.4-102)  | 138<br>(112-161)  | 911         |

from NHANES III (Blount et al., 2000). In the current NHANES 1999-2000 subsample, geometric mean levels of the demographic groups were compared after adjustment for the covariates of race/ethnicity, age, gender, and urinary creatinine. Urinary mono-butyl phthalate levels were higher in people aged 6-11 years than for people in the other two age groups and higher in people aged 12-19 years than in those aged 20 years and older. Levels in females were higher than in males. It is unknown whether differences between ages or sexes represent differences in exposure, body-size relationships, or metabolism.

A statistical examination of phthalate levels in a non-random subsample from NHANES III (Koo et al., 2002) suggested that higher levels of mono-butyl phthalates in urine were associated with a lower level of education.

**Table 65. Mono-butyl phthalates (creatinine adjusted)**

Geometric mean and selected percentiles of urine concentrations (in µg/gram of creatinine) for the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999-2000.

|                               | Geometric mean<br>(95% conf. interval) | Selected percentiles<br>(95% confidence interval) |                     |                     |                     |                     |                     | Sample size |
|-------------------------------|--|---|---------------------|---------------------|---------------------|---------------------|---------------------|-------------|
|                               |  | 10th  | 25th                | 50th                | 75th                | 90th                | 95th                |             |
| <b>Total, age 6 and older</b> | 22.4<br>(21.1-23.8)                    | 7.74<br>(6.79-8.63)                               | 12.8<br>(11.7-14.2) | 21.9<br>(20.3-23.4) | 38.9<br>(36.1-41.1) | 68.3<br>(61.7-74.9) | 97.5<br>(84.4-113)  | 2541        |
| <b>Age group</b>              |  |   |                     |                     |                     |                     |                     |             |
| 6-11 years                    | 41.9<br>(37.2-47.4)                    | 16.7<br>(10.6-22.0)                               | 27.8<br>(23.3-32.1) | 38.9<br>(32.5-49.6) | 65.7<br>(54.9-80.0) | 107<br>(80.0-162)   | 159<br>(106-196)    | 328         |
| 12-19 years                   | 24.3<br>(22.0-26.8)                    | 9.80<br>(7.68-11.5)                               | 15.4<br>(13.2-17.0) | 23.6<br>(21.6-26.3) | 37.6<br>(32.6-42.2) | 62.3<br>(53.7-72.1) | 88.1<br>(69.6-139)  | 752         |
| 20 years and older            | 20.4<br>(19.0-21.9)                    | 7.08<br>(5.95-8.18)                               | 11.7<br>(10.9-13.0) | 19.5<br>(18.4-21.0) | 34.9<br>(31.2-38.2) | 62.4<br>(56.0-68.6) | 91.0<br>(78.3-112)  | 1461        |
| <b>Gender</b>                 |  |   |                     |                     |                     |                     |                     |             |
| Males                         | 17.3<br>(16.0-18.7)                    | 6.54<br>(5.70-7.46)                               | 10.2<br>(9.57-11.3) | 17.0<br>(15.5-18.7) | 28.6<br>(25.8-32.0) | 49.1<br>(42.4-53.9) | 63.6<br>(57.3-76.7) | 1215        |
| Females                       | 28.6<br>(26.5-30.9)                    | 10.6<br>(8.54-11.7)                               | 17.3<br>(15.9-18.6) | 28.6<br>(26.2-30.4) | 50.6<br>(44.9-54.2) | 84.3<br>(73.5-97.6) | 131<br>(98.5-153)   | 1326        |
| <b>Race/ethnicity</b>         |  |   |                     |                     |                     |                     |                     |             |
| Mexican Americans             | 21.2<br>(18.9-23.9)                    | 6.98<br>(5.23-8.50)                               | 12.9<br>(10.2-14.5) | 20.0<br>(18.2-22.8) | 40.1<br>(33.7-44.0) | 63.6<br>(57.6-70.1) | 81.6<br>(73.9-100)  | 814         |
| Non-Hispanic blacks           | 23.9<br>(21.6-26.4)                    | 8.51<br>(6.90-9.92)                               | 13.9<br>(12.4-16.0) | 25.0<br>(20.7-27.9) | 42.2<br>(36.8-49.3) | 69.6<br>(62.6-83.9) | 94.4<br>(76.7-108)  | 603         |
| Non-Hispanic whites           | 21.3<br>(19.6-23.2)                    | 7.16<br>(6.03-8.54)                               | 12.1<br>(11.1-13.9) | 20.5<br>(18.9-22.9) | 36.4<br>(32.3-39.6) | 67.1<br>(58.1-74.9) | 97.6<br>(81.4-135)  | 911         |